

10 CSR 10-5.490 Municipal Solid Waste Landfills

(1) Applicability.

- (A) This rule applies to all municipal solid waste (MSW) landfills located in the St. Louis ozone nonattainment area (Jefferson, Franklin, St. Charles, St. Louis Counties and St. Louis City) that have accepted waste any time since November 8, 1987, or have additional capacity available for future waste deposition.
- (B) For purposes of obtaining an operating permit under Title V of the Clean Air Act, the owner or operator of an MSW landfill subject to this rule with a design capacity less than two and one-half (2.5) million megagrams or two and one-half (2.5) million cubic meters is not subject to the requirements to obtain an operating permit for the landfill under 40 Code of Federal Regulations (CFR) part 70 or 71, unless the landfill is otherwise subject to either 40 CFR part 70 or 71. For purposes of submitting a timely application for an operating permit under 40 CFR part 70 or 71, the owner or operator of an MSW landfill subject to the rule with a design capacity greater than or equal to two and one-half (2.5) million megagrams and two and one-half (2.5) million cubic meters on the effective date of EPA approval of the state's program under section 111(d) of the Clean Air Act (June 23, 1998), and not otherwise subject to either 40 CFR part 70 or 71, becomes subject to the requirements of section 70.5(a)(1)(i) or 71.5(a)(1)(i) of the Clean Air Act ninety (90) days after the effective date of such 111(d) program approval, even if the design capacity report is submitted earlier.
- (C) When an MSW landfill subject to this rule is closed, the owner or operator is no longer subject to the requirement to maintain an operating permit under 40 CFR part 70 or 71 for the landfill if the landfill is not otherwise subject to the requirements of either 40 CFR part 70 or 71 and if either of the following conditions is met:
 - 1. The landfill was never subject to a requirement for a control system under section (3) of this rule; or
 - 2. The owner or operator meets the conditions for control system removal specified in section

60.752(b)(2)(v) of subpart WWW.

(2) Definitions.

- (A) Active collection system—A gas collection system that uses gas mover equipment.
- (B) Closed landfill—A landfill in which solid waste is no longer being placed, and in which no additional wastes will be placed without first filing a notification of modification as prescribed under 40 CFR part 60.7(a)(4)(incorporated by reference. Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed.
- (C) Closure—That point in time when a landfill becomes a closed landfill.
- (D) Design capacity—The maximum amount of waste the landfill can accept, as specified in the construction permit issued by the county or state agency responsible for regulating the landfill, plus any in-place waste not accounted for in the most recent permit. If the owner or operator chooses to convert the design capacity volume to mass or from mass to volume to demonstrate its design capacity is less than two and one-half (2.5) million megagrams or two and one-half (2.5) million cubic meters, the calculation must be recalculated annually.
- (E) Enclosed combustor—An enclosed firebox which maintains a relatively constant limited peak temperature generally using a limited supply of combustion air. An enclosed flare is considered an enclosed combustor.
- (F) Flare—An open combustor without enclosure or shroud.
- (G) Gas mover equipment—The equipment (i.e., fan, blower, compressor) used to transport landfill gas through the header system.
- (H) Household waste—Any solid waste (including garbage, trash, and sanitary waste in septic tanks) derived from households (including, but not limited to, single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic

grounds, and day-use recreation areas).

- (I) Lateral expansion—A horizontal expansion of the waste boundaries of an existing MSW landfill. A lateral expansion is not a modification unless it results in an increase in the design capacity of the landfill.
- (J) Modification—An increase in the permitted volume design capacity of the landfill by either horizontal or vertical expansion based on its most recent permitted design capacity. Modification does not occur until the owner or operator commences construction on the horizontal or vertical expansion.
- (K) Municipal solid waste landfill or MSW landfill—An entire disposal facility in a contiguous geographical space where household waste is placed in or on land. An MSW landfill may also receive other types of Resource Conservation and Recovery Act (RCRA) Subtitle D wastes such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and industrial solid waste. Portions of an MSW landfill may be separated by access roads. An MSW landfill may be publicly or privately owned. An MSW landfill may be a new MSW landfill, an existing MSW landfill or a lateral expansion.
- (L) NMOC—Nonmethane organic compounds.
- (M) Passive collection system—A gas collection system that solely uses positive pressure within the landfill to move the gas rather than using gas mover equipment.
- (N) Solid waste—Any garbage, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permits under 33 U.S.C. 1342 (incorporated by reference), or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq., incorporated by

reference).

- (O) Sufficient density—Any number, spacing, and combination of collection system components, including vertical wells, horizontal collectors, and surface collectors, necessary to maintain emission and migration control as determined by measures of performance set forth in this rule.
- (P) Sufficient extraction rate—A rate sufficient to maintain a negative pressure at all wellheads in the collection system without causing air infiltration, including any wellheads connected to the system as a result of expansion or excess surface emissions, for the life of the blower.

(3) General Provisions.

- (A) Each owner or operator of a municipal solid waste (MSW) landfill having a design capacity less than one (1.0) million megagrams (one and one-tenth (1.1) million tons) by mass or one (1.0) million cubic meters (one and three-tenths (1.3) million cubic yards) by volume shall submit within ninety (90) days of the rule effective date an initial design capacity report, as described in section (7) of this rule, to the director. The landfill may calculate design capacity in either megagrams or cubic meters for comparison with the exemption values. Any density conversions shall be documented and submitted with the report. Submittal of the initial design capacity report shall fulfill the requirements of this rule, except as provided for in paragraphs (3)(A)1. and 2. of this rule.
 - 1. The owner or operator shall submit an amended design capacity report to the director when there is any increase in the design capacity of the landfill. An increase in design capacity may result from an increase in the area or depth of the landfill, a change in the operating procedures of the landfill, or any other means.
 - 2. If an increase in the design capacity of the landfill results in a revised maximum design capacity equal to or greater than one (1.0) million megagrams or one (1.0) million cubic meters, the owner or operator shall comply with

the provisions of subsection (3)(B) of this rule.

- (B) Each owner or operator of an MSW landfill having a design capacity equal to or greater than one (1.0) million megagrams or one (1.0) million cubic meters shall submit within ninety (90) days of the rule effective date an initial design capacity report and an NMOC emission rate report, as described in sections (4) and (7) of this rule, to the director. The NMOC emission rate shall be recalculated annually except as provided for in subsection (7)(C) of this rule.
 - 1. If the calculated NMOC emission rate is less than twenty-five (25) megagrams (twenty-seven and one half (27.5) tons) per year, the owner or operator shall—
 - A. Submit an annual emission rate report to the director; and
 - B. Recalculate the NMOC emission rate annually until such time as the calculated NMOC emission rate is equal to or greater than twenty-five (25) megagrams, or the landfill closes.
 - (I) If the NMOC emission rate, upon recalculation, is equal to or greater than twenty-five (25) megagrams per year, the owner or operator shall install a collection and control system in compliance with paragraph (3)(B)2. of this rule.
 - (II) If the landfill is permanently closed, a closure notification shall be submitted to the director.
 - 2. If the calculated NMOC emission rate is equal to or greater than twenty-five (25) megagrams per year, the owner or operator shall—
 - A. Submit a collection and control system design plan prepared by a professional engineer to the director within one (1) year of the NMOC emission rate report. Permit modification approval from the Missouri Department of Natural Resources' Solid Waste Management Program shall be required prior to

construction of any gas collection system.

- (I) The collection and control system shall meet the design requirements of subparagraph (3)(B)2.B. of this rule.
 - (II) The collection and control system design plan shall include any alternatives to the operation standards, test methods, procedures, compliance measures, monitoring, recordkeeping or reporting provisions of sections (4) through (7) of this rule proposed by the owner or operator.
 - (III) The collection and control system design plan shall either conform with specifications for active collection systems or include a demonstration to the director's satisfaction of the sufficiency of the alternate system.
 - (IV) The director will review the collection and control system design plan and either approve it, disapprove it, or request that additional information be submitted;
- B. Install a collection and control system that captures the gas generated within the landfill as required by part (3)(B)2.B.(I) or (II) and subparagraph (3)(B)2.C. of this rule within thirty (30) months after the first annual report in which the emission rate equals or exceeds twenty-five (25) megagrams per year, unless Tier 2 or Tier 3 sampling under subsection (4)(C) or (4)(D) of this rule demonstrates that the emission rate is less than twenty-five (25) megagrams per year, as specified in paragraph (7)(D)1. or 2. of this rule.

(I) An active collection system shall—

- (a) Be designed to handle the maximum expected gas flow rate from the entire area of the landfill that warrants control;
- (b) Collect gas from each area, cell,

or group of cells in the landfill in which the initial solid waste has been placed for a period of five (5) years or more, if active, or two (2) years or more, if closed or at final grade;

- (c) Collect gas at a sufficient extraction rate; and
- (d) Be designed to minimize off-site migration of subsurface gas.

(II) A passive collection system shall—

- (a) Comply with the provisions of subparts (3)(B)2.B.(I)(a), (b), and (d) of this rule; and
- (b) Be installed with liners on the bottom and all sides in all areas in which gas is to be collected;

(III) Each owner or operator of an MSW landfill gas collection and control system shall—

- (a) Operate the collection system with negative pressure at each wellhead except under the following conditions:

- I. A fire or increased well temperature. The owner or operator shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in subsection (7)(H) of this rule;

- II. Use of a geomembrane or synthetic cover. The owner or operator shall develop acceptable pressure limits in

the design plan; and

III. A decommissioned well. A well may experience a static positive pressure after shut down to accommodate for declining flows. All design changes shall be approved by the director;

(b) Operate each interior wellhead in the collection system with a landfill gas temperature less than fifty-five degrees Celsius (55°C) and with either a nitrogen level less than twenty percent (20%) or an oxygen level less than five percent (5%). The owner or operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.

I. The nitrogen level shall be determined using Method 3C of Appendix A, 40 CFR part 60, unless an alternative test method is established as allowed by part (3)(B)2.A.(II) of this rule.

II. Unless an alternative test method is established as allowed by part (3)(B)2.A.(II) of this rule, the oxygen shall be determined by an oxygen meter using Method 3A of Appendix A, 40 CFR part 60, except that—

a. The span shall be set so

that the regulatory limit is between twenty and fifty percent (20 and 50%) of the span;

- b. A data recorder is not required;
- c. Only two (2) calibration gases are required, a zero and span, and ambient air may be used as the span;
- d. A calibration error check is not required; and
- e. The allowable sample bias, zero drift, and calibration drift are plus or minus ten percent ($\pm 10\%$);

- (c) Operate the collection system so that the methane concentration is less than five hundred (500) parts per million above background concentration at the surface of the landfill. To determine if this level is exceeded, the owner or operator shall conduct surface testing around the perimeter of the collection area along a pattern that traverses the landfill at thirty (30) meter intervals and where visual observations indicate elevated concentrations of landfill gas, such as distressed vegetation and cracks or seeps in the cover. The owner or operator may establish an alternative traversing pattern that ensures equivalent coverage. A surface monitoring design plan shall be developed that includes a topographical map with the monitoring route and the rationale for any site-specific deviations

from the thirty (30)-meter intervals. Areas with steep slopes or other dangerous areas may be excluded from the surface testing;

- (d) Operate the system such that all collected gases are vented to a control system designed and operated in compliance with subparagraph (3)(B)2.C. of this rule. In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within one (1) hour;
 - (e) Operate the control or treatment system at all times when the collected gas is routed to the system; and
 - (f) If monitoring demonstrates that the operational requirement in subpart (3)(B)2.B.(III)(a), (b), or (c) of this rule are not met, corrective action shall be taken as specified in subsection (5)(B) of this rule. If corrective actions are taken as specified in subsection (5)(B) of this rule, the monitored exceedance is not a violation of the operational requirements in this section;
- C. Route all the collected gas to one or more of the following control systems:
- (I) An open flare designed and operated in accordance with 40 CFR part 60.18 (incorporated by reference);
 - (II) A control system designed and operated to reduce NMOC by ninety-eight (98) weight-percent, or, when an enclosed

combustion device is used for control, to either reduce NMOC by ninety-eight (98) weight-percent, or reduce the outlet NMOC concentration to less than twenty (20) parts per million by volume, dry basis as hexane at three percent (3%) oxygen. The reduction efficiency or parts per million by volume shall be established by an initial performance test, to be completed no later than one hundred eighty (180) days after the initial startup of the approved control system; or

(III) A system that routes the collected gas to a treatment system that processes the collected gas for subsequent sale or use; and

D. The collection and control system may be capped or removed provided the following conditions are met:

(I) The landfill shall be no longer accepting solid waste and be permanently closed. A closure report shall be submitted to the director;

(II) The collection and control system has been in operation a minimum of fifteen (15) years; and

(III) The calculated NMOC gas produced by the landfill is less than twenty-five (25) megagrams per year on three (3) successive test dates. The test dates shall be no less than ninety (90) days apart and no more than one hundred eighty (180) days apart; and

E. The planning, awarding of contracts, and installation of MSW landfill air emission collection and control equipment capable of meeting the emission standards in subsection (3)(B) of this rule shall be accomplished within thirty (30) months after the date the initial NMOC emission rate report shows NMOC

emissions equal or exceed twenty-five (25) megagrams per year.

(4) Test Methods.

- (A) The owner or operator of an MSW landfill shall calculate the NMOC emission rate using either the equation provided in paragraph (4)(A)1. of this rule or the equation provided in paragraph (4)(A)2. of this rule. Both equations may be used if the actual year-to-year solid waste acceptance rate is known. The values to be used in both equations are 0.05 per year for k , 170 cubic meters per megagram for L_o , and 4,000 parts per million by volume as hexane for the C_{NMOC} unless site-specific values are calculated as described under Tier 1, Tier 2, and Tier 3 in subsections (4)(B), (4)(C), and (4)(D) of this rule. For landfills located in geographical areas with a thirty year annual average precipitation of less than 25 inches, as measured at the nearest representative official meteorologic site, the k value to be used is 0.02 per year.

1. The mass of nondegradable solid waste may be subtracted from the total mass of solid waste in a particular section of the landfill when calculating the value for M_i if documentation of the nature and amount of such wastes is maintained. The following equation shall be used if the actual year-to-year solid waste acceptance rate is known:

$$M_{NMOC} = \sum_{i=1}^n 2 k L_o M_i (e^{-kt_i}) (C_{NMOC}) (3.6 \times 10^{-9})$$

where,

- M_{NMOC} = Total NMOC emission rate from the landfill, megagrams per year
 k = methane generation rate constant, year⁻¹
 L_o = methane generation potential, cubic meters per megagram solid waste
 M_i = mass of solid waste in the i^{th} section, megagrams
 t_i = age of the i^{th} section, years
 C_{NMOC} = concentration of NMOC, parts per million by volume as hexane
 3.6×10^{-9} = conversion factor

2. The mass of nondegradable solid waste may be subtracted from the average annual acceptance rate when calculating a value for R if documentation is provided. The following equation shall be used if the actual year-to-year solid waste acceptance rate is unknown:

$$M_{\text{NMOC}} = 2L_o R (e^{-kc} - e^{-kt}) (C_{\text{NMOC}})(3.6 \times 10^{-9})$$

where,

M_{NMOC} = mass emission rate of NMOC, megagrams per year

L_o = methane generation potential, cubic meters per megagram solid waste

R = average annual acceptance rate, megagrams per year

k = methane generation rate constant, year⁻¹

c = time since closure, years (for active landfill c = 0 and $e^{-kc} = 1$)

t = age of landfill, years

C_{NMOC} = concentration of NMOC, parts per million by volume as hexane

3.6×10^{-9} = conversion factor

- (B) Tier 1. The owner or operator shall compare the calculated NMOC mass emission rate to the standard of twenty-five (25) megagrams per year.

1. If the NMOC emission rate calculated in paragraph (4)(A)1. or 2. of this rule is less than twenty-five (25) megagrams per year, then the landfill owner shall submit an emission rate report and shall recalculate the NMOC mass emission rate annually as required under paragraph (3)(B)1. of this rule.

2. If the calculated NMOC emission rate is equal to or greater than twenty-five (25) megagrams per year, then the landfill owner shall either comply with paragraph (3)(B)2. of this rule, or determine a site-specific NMOC concentration and recalculate the NMOC emission rate using the procedures provided in subsection (4)(C) of this rule.

- (C) Tier 2. The owner or operator shall determine the NMOC concentration using the following sampling procedure. The landfill owner or operator shall install at least two (2) sample probes per hectare of landfill surface

that has retained solid waste for at least two (2) years. If the landfill is larger than twenty-five (25) hectares in area, only fifty (50) samples are required. The sample probes shall be located to avoid known areas of nondegradable solid waste. The owner or operator shall collect and analyze one (1) sample of landfill gas from each probe to determine the NMOC concentration using Method 25C or Method 18 of Appendix A, 40 CFR part 60. If composite sampling is used, equal volumes shall be taken from each sample probe. If more than the required number of samples are taken, all samples shall be used in the analysis. The landfill owner or operator shall divide the NMOC concentration from Method 25C by six (6) to convert from C_{NMOC} as carbon to C_{NMOC} as hexane. The owner or operator shall recalculate the NMOC mass emission rate using the equations provided in paragraph (4)(A)1. or 2. of this rule and using the average NMOC concentration from the collected samples instead of the default value in the equation.

1. If the resulting NMOC mass emission rate is less than twenty-five (25) megagrams per year, the owner or operator shall submit an emission rate report as required under paragraph (3)(B)1. of this rule and retest the site-specific NMOC concentration every five (5) years using the methods specified in this section.
 2. If the resulting mass emission rate calculated using the site-specific NMOC concentration is equal to or greater than twenty-five (25) megagrams per year, then the landfill owner or operator shall either comply with paragraph (3)(B)2. of this rule, or determine the site-specific methane generation rate constant and recalculate the NMOC emission rate using the site-specific methane generation rate using the procedure specified in subsection (4)(D) of this rule.
- (D) Tier 3. The site-specific methane generation rate constant shall be determined using the procedures provided in Method 2E of Appendix A, 40 CFR part 60. The landfill owner or operator shall estimate the NMOC mass emission rate using the equations in paragraph (4)(A)1. or 2. of this rule using a site-specific

methane generation rate constant k , and using the site-specific NMOC concentration as determined in subsection (4)(C) of this rule instead of the default values provided in subsection (4)(A) of this rule. The landfill owner or operator shall compare the resulting NMOC mass emission rate to the standard of twenty-five (25) megagrams per year.

1. If the NMOC mass emission rate is less than twenty-five (25) megagrams per year, then the owner or operator shall submit a periodic emission rate report as provided in paragraph (3)(B)1. of this rule and shall recalculate the NMOC mass emission rate annually. The calculation of the methane generation rate constant is performed only once, and the value obtained shall be used in all subsequent annual NMOC emission rate calculations.
 2. If the NMOC mass emission rate as calculated using the site-specific methane generation rate and concentration of NMOC is equal to or greater than twenty-five (25) megagrams per year, the owner or operator shall comply with paragraph (3)(B)2. of this rule.
- (E) The owner or operator may use other methods to determine the NMOC concentration or a site-specific k as an alternative to the methods in subsection (4)(C) and (D) of this rule if the method has been approved in writing by the director.
- (F) After the installation of a collection and control system in compliance with section (5) of this rule, the owner or operator shall calculate the NMOC emission rate for purposes of determining when the system can be removed as provided in subparagraph (3)(B)2.D. of this rule, using the following equation:

where,

$$M_{\text{NMOC}} = 1.89 \times 10^{-3} Q_{\text{LFG}} C_{\text{NMOC}}$$

M_{NMOC} = mass emission rate of NMOC, megagrams per year

Q_{LFG} = flow rate of landfill gas, cubic meters per minute

C_{NMOC} = NMOC concentration, parts per million by volume as hexane

1. The flow rate of landfill gas, Q_{LFG} , shall be determined by measuring the total landfill gas flow rate at the common header pipe that leads to the control device using a gas flow measuring device calibrated according to the provisions of section 4 of Method 2E of Appendix A, 40 CFR part 60.
 2. The average NMOC concentration, C_{NMOC} , shall be determined by collecting and analyzing landfill gas sampled from the common header pipe before the gas moving or condensate removal equipment using the procedures in Method 25C or Method 18 of Appendix A, 40 CFR part 60. If using Method 18, the minimum list of compounds to be tested shall be those published in the most recent *Compilation of Air Pollutant Emission Factors* (AP-42). The sample location on the common header pipe shall be before any condensate removal or other gas refining units. The landfill owner or operator shall divide the NMOC concentration from Method 25C by six (6) to convert from C_{NMOC} as carbon to C_{NMOC} as hexane.
 3. The owner or operator may use another method to determine landfill gas flow rate and NMOC concentration if the method has been approved by the director.
- (G) The owner or operator of each MSW landfill shall estimate the NMOC emission rate for comparison to the Prevention of Significant Deterioration (PSD) major source and significance levels in section 51.166 or 52.21 of 40 CFR parts 51 and 52 using AP-42 or other approved measurement procedures. If a collection system, which complies with the provisions in paragraph (3)(B)2. of this rule is already installed, the owner or operator shall estimate the NMOC emission rate using the procedures provided in subsection (4)(F) of this rule.
- (H) For the performance test required in part (3)(B)2.C.(II) of this rule, Method 25C or Method 18 shall be used to determine compliance with ninety-eight (98) weight-percent efficiency or the twenty parts per million by volume (20 ppmv) outlet concentration level,

unless another method to demonstrate compliance has been approved by the director as provided by part (3)(B)2.A.(II) of this rule. If using Method 18, the minimum list of compounds to be tested shall be those published in the most recent *Compilation of Air Pollutant Emission Factors* (AP-42). The following equation shall be used to calculate efficiency:

$$\text{Control Efficiency} = (\text{NMOC}_{\text{in}} - \text{NMOC}_{\text{out}}) / (\text{NMOC}_{\text{in}})$$

where,

NMOC_{in} = mass of NMOC entering control device
 NMOC_{out} = mass of NMOC exiting control device

(5) Compliance.

(A) Except as provided for in part (3)(B)2.A.(II) of this rule, the following methods shall be used to determine whether the gas collection system is in compliance:

1. One of the following equations shall be used in calculating the maximum expected gas generation flow rate from the landfill as described in subpart (3)(B)2.B.(I)(a) of this rule. The k and L_o kinetic factors shall be those published in the most recent *Compilation of Air Pollution Emission Factors* (AP-42) or other site-specific values demonstrated to be appropriate and approved in writing by the director. A value of no more than fifteen (15) years shall be used for the intended use period of the gas mover equipment. The active life of the landfill is the age of the landfill plus the estimated number of years until closure. After installation of a collection and control system, actual flow data shall be used to project the maximum flow rate.

A. For sites with unknown year-to-year solid waste acceptance rate:

$$Q_m = 2L_o R (e^{-kc} - e^{-kt})$$

where,

Q_m = maximum expected gas generation flow rate, cubic meters per year
 L_o = methane generation potential, cubic meters per megagram solid waste

R = average annual acceptance rate,
megagrams per year

k = methane generation rate constant, year⁻¹

c = time since closure, years (for an active landfill c = 0 and e^{-kc} = 1)

t = age of the landfill at equipment installation plus the time the owner or operator intends to use the gas mover equipment or active life of the landfill, whichever is less. If the equipment is installed after closure, t is the age of the landfill at installation, years

B. For sites with known year-to-year solid waste acceptance rate:

$$Q_m = \sum_{i=1}^n E \quad 2 \quad k \quad L_o \quad M_i \quad (e^{-kt_i})$$

where,

Q_m = maximum expected gas generation flow rate, cubic meters per year

k = methane generation rate constant, year⁻¹

L_o = methane generation potential, cubic meters per megagram solid waste

M_i = mass of solid waste in the section, megagrams

t_i = age of the ith section, years;

2. For the purposes of determining sufficient density of gas collectors for compliance with subpart (3)(B)2.B.(I)(b) of this rule, the owner or operator shall design a system of vertical wells, horizontal collectors, or other collection devices, satisfactory to the director, capable of controlling and extracting gas from all portions of the landfill;
3. For the purposes of demonstrating whether the gas collection system flow rate is sufficient to determine compliance with subpart (3)(B)2.B.(I)(c) of this rule, the owner or operator shall measure gauge pressure in the gas collection header at each individual well, monthly. If a positive pressure exists, action shall be initiated to correct the exceedance within five (5) calendar

days. If negative pressure cannot be achieved without excess air infiltration within fifteen (15) calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within one hundred twenty (120) days of the initial measurement of positive pressure. Compliance with this subsection will not be required during the first one hundred eighty (180) days after gas collection system start-up. An alternative timeline for correcting the exceedance may be submitted to the director for approval; and

4. An owner or operator seeking to demonstrate compliance with subpart (3)(B)2.B.(I)(d) of this rule shall provide information satisfactory to the director demonstrating that off-site migration is being controlled.
- (B) After installation of the collection system, the owner or operator shall monitor surface concentrations of methane along the entire perimeter of the collection area and in a serpentine pattern every thirty (30) meters for each collection area on a quarterly basis using an organic vapor analyzer, flame ionization detector, or other portable monitor meeting the specification provided in Method 21 of Appendix A, 40 CFR part 60, except that "methane" shall replace all references to VOC.
1. The background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least thirty (30) meters from the perimeter wells.
 2. Surface emission monitoring shall be performed in accordance with section 4.3.1 of Method 21 of Appendix A, 40 CFR part 60, except that the probe inlet shall be placed within five to ten centimeters (5-10 cm) of the ground.
 3. Any reading of five hundred parts per million (500 ppm) or more above background at any location shall be recorded as an exceedance.
- A. The location of each exceedance shall be

marked, and the location recorded.

- B. Cover maintenance or adjustments to the vacuum of the adjacent wells to increase the gas collection in the vicinity of each exceedance shall be made within ten (10) calendar days of detecting the exceedance.
- C. Any location at which an exceedance has occurred shall be rechecked within ten (10) calendar days of detecting the exceedance. The location shall be rechecked every ten (10) calendar days until either a reading below five hundred part per million (500 ppm) is taken or there are three (3) exceedances.
- D. Any location that initially exceeded five hundred parts per million (500 ppm) methane, but does not exceed five hundred parts per million (500 ppm) methane at the ten (10)-day recheck, shall be remonitored one (1) month from the initial exceedance. If the monthly remonitoring does not exceed five hundred parts per million (500 ppm) methane, then quarterly monitoring can be resumed.
- E. When any location exceeds five hundred parts per million (500 ppm) methane three (3) times within a quarterly period, a new well or other collection device shall be installed within one hundred twenty (120) calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding time line for installation may be submitted to the director for written approval.

(6) Monitoring.

- (A) Each owner or operator seeking to comply with part (3)(B)2.B.(I) of this rule for an active gas collection system shall install a sampling port and a thermometer or other temperature measuring device, or an access port for temperature measurements at each wellhead and—
 - 1. Measure the gauge pressure in the gas collection

header on a monthly basis;

2. Monitor the nitrogen or oxygen concentration in the landfill gas on a monthly basis; and
3. Monitor the temperature of the landfill gas on a monthly basis.

(B) Each owner or operator seeking to comply with subparagraph (3)(B)2.C. of this rule using an enclosed combustion device shall calibrate, maintain, and operate according to the manufacturer's specifications, the following equipment:

1. A temperature monitoring device equipped with a continuous recorder and having a minimum accuracy of plus or minus one percent ($\pm 1\%$) of the temperature being measured expressed in degrees Celsius or plus or minus one-half degree Celsius ($\pm 0.5^\circ \text{C}$), whichever is greater. A temperature monitoring device is not required for boilers or process heaters with maximum design heat input capacity greater than forty-four (44) megawatts; and
2. A device that records flow to or bypass of the control device. The owner or operator shall either—
 - A. Install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every fifteen (15) minutes; or
 - B. Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration.

(C) Each owner or operator seeking to comply with subparagraph (3)(B)2.C. of this rule using an open flare shall install, calibrate, maintain, and operate according to the manufacturer's specifications, the following equipment:

1. A heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence

of a flame; and

2. A device that records flow to or bypass of the flare. The owner or operator shall either—
 - A. Install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every fifteen (15) minutes; or
 - B. Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration.

(D) Each owner or operator seeking to comply with subparagraph (3)(B)2.C. of this rule using a device other than an open flare or an enclosed combustion device shall provide information satisfactory to the director describing the operation of the control device, the operating parameters that would indicate proper performance, and appropriate monitoring procedures. The director shall review the information and either approve it, or request that additional information be submitted.

(E) Each owner or operator seeking to comply with subsection (5)(B) of this rule shall monitor surface concentrations of methane according to the instrument specifications. Any closed landfill that has no exceedances of the five hundred parts per million (500 ppm) standard in three (3) consecutive quarterly monitoring periods may change to annual monitoring. Any exceedance of the five hundred parts per million (500 ppm) standard recorded during the annual monitoring shall return the monitoring frequency to quarterly testing.

(7) Reporting and Record Keeping.

(A) The initial design capacity report shall be submitted ninety (90) days from the rule effective date and contain the following information:

1. A map or plot of the landfill, providing the size and location of the landfill, and identifying all areas where solid waste may be landfilled according to the provision of the state, local,

tribal, or RCRA construction or operating permit;
and

2. The maximum design capacity of the landfill.
Where the maximum design capacity is specified in the state or local construction or RCRA permit, a copy of the permit specifying the maximum design capacity may be submitted as part of the report. If the maximum design capacity of the landfill is not specified in the permit, the maximum design capacity shall be calculated using good engineering practices. The calculations shall be provided, along with such parameters as depth of solid waste, solid waste acceptance rate, and compaction practices as part of the report. The director may request other information as may be necessary to verify the maximum design capacity of the landfill.

- (B) An amended design capacity report shall be submitted to the director providing notification of any increase in the design capacity of the landfill. The amended design capacity report shall be submitted within ninety (90) days of the issuance of an amended construction or operating permit.
- (C) The initial NMOC emission rate report shall be submitted within ninety (90) days of the rule effective date and annually thereafter. The initial NMOC emission rate report may be combined with the initial design capacity report required in subsection (7)(A) of this rule. The NMOC emission rate report shall include all the data, calculations, sample reports and measurements used to estimate the annual emission rate. An annual emission rate report will not be required for landfills after installation of a collection and control system.
- (D) Each owner or operator subject to subparagraph (3)(B)2.A. of this rule shall submit a collection and control system design plan to the director within one (1) year of the NMOC emission rate report, required under subsection (7)(C) of this rule, in which the emission rate exceeds twenty-five (25) megagrams per year, except as follows:

1. If the owner or operator elects to recalculate the

NMOC emission rate after Tier 2 NMOC sampling and analysis as provided under subsection (4)(C) of this rule and the resulting rate is less than twenty-five (25) megagrams per year, annual periodic reporting shall be resumed, using the Tier 2 determined site-specific NMOC concentration, until the calculated emission rate is equal to or greater than twenty-five (25) megagrams per year or the landfill is closed. The revised NMOC emission rate report, with the recalculated emission rate based on NMOC sampling and analysis, shall be submitted within one hundred eighty (180) days of the first calculated exceedance of twenty-five (25) megagrams per year; and

2. If the owner or operator elects to recalculate the NMOC emission rate after determining a site-specific methane generation rate constant (k), as provided in Tier 3 in subsection (4)(D) of this rule and the resulting NMOC emission rate is less than twenty-five (25) megagrams per year, annual periodic reporting shall be resumed. The resulting site-specific methane generation rate constant (k) shall be used in the emission rate calculation until such time as the emissions rate calculation results in an exceedance. The revised NMOC emission rate report, with the site-specific methane generation rate constant (k) shall be submitted to the director within one (1) year of the first calculated emission rate exceeding twenty-five (25) megagrams per year.

(E) Each owner or operator of a controlled landfill shall submit a closure report to the director within thirty (30) days of the date the landfill ceases accepting solid waste. The director may request additional information as may be necessary to verify that permanent closure has taken place.

(F) Each owner or operator of a controlled landfill shall submit an equipment removal report to the director thirty (30) days prior to removal or cessation of operation of the control equipment. The report shall contain all of the following items:

1. A copy of the closure report;

2. A copy of the initial performance test report demonstrating that the fifteen (15)-year minimum control period has expired; and

3. Dated copies of three (3) successive NMOC emission rate reports demonstrating that the landfill is no longer producing twenty-five (25) megagrams or greater of NMOC per year.
- (G) Each owner or operator of an MSW landfill subject to paragraph (3)(B)2. of this rule shall keep up-to-date, readily accessible on-site records of the following:
1. Maximum design capacity;
 2. Control equipment compliance monitoring;
 3. A plot map showing each existing and planned collector in the system and providing a unique identification location label for each collector; and
 4. Collection and control system exceedances of the operation standards and the location of each exceedance.
- (H) Each owner or operator of a landfill seeking to comply with paragraph (3)(B)2. of this rule using an active collection system designed in accordance with subparagraph (3)(B)2.B. of this rule shall submit to the director annual reports of the recorded information in paragraphs (7)(H)1.-6. of this rule. The initial annual report shall be submitted within one hundred and eighty (180) days of installation and start-up of the collection and control system, and shall include an initial performance test report.
1. Value and length of time for exceedance of applicable parameters monitored under subsections (6)(A), (B), (C), and (D) of this rule.
 2. Description and duration of all periods when the gas stream is diverted from the control device through a bypass line or the indication of bypass flow.
 3. Description and duration of all periods when the control device was not operating for a period exceeding one (1) hour and length of time the control device was not operating.

4. All periods when the collection system was not operating in excess of five (5) days.
 5. The location of each exceedance of the five hundred parts per million (500 ppm) methane concentration as provided in subpart (3)(B)2.B.(III)(c) of this rule and the concentration recorded at each location for which an exceedance was recorded in the previous month.
 6. The date of installation and the location of each well or collection system expansion added.
- (I) Each owner or operator seeking to comply with subparagraph (3)(B)2.A. of this rule shall include the following information with the initial performance test report:
1. A diagram of the collection system showing collection system positioning including all wells, horizontal collectors, surface collectors, or other gas extraction devices, including the locations of any areas excluded from collection and the proposed sites for the future collection system expansion;
 2. The data upon which the sufficient density of wells, horizontal collectors, surface collectors, or other gas extraction devices and the gas mover equipment sizing are based;
 3. The documentation of the presence of asbestos or nondegradable material for each area from which collection wells have been excluded based on the presence of asbestos or nondegradable material;
 4. The sum of the gas generation flow rates for all areas from which collection wells have been excluded based on nonproductivity and the calculations of gas generation flow rate for each excluded area;
 5. The provisions for increasing gas mover equipment capacity with increased gas generation flow rate, if the present gas mover equipment is inadequate to move the maximum flow rate expected over the life of the landfill; and

6. The provisions for the control of off-site migration.
- (J) Landfill owners or operators who convert design capacity from volume to mass or mass to volume to demonstrate that landfill design capacity is less than one (1.0) million megagrams or one (1.0) million cubic meters, as provided in the definition of design capacity, shall keep readily accessible, on-site records of the annual recalculation of site-specific density, design capacity, and the supporting documentation. Off-site records may be maintained if they are retrievable within four (4) hours of request. Either paper copy or electronic formats are acceptable.

EPA Rulemakings

CFR: 40 C.F.R. 62.6357 (d)

FRM: 65 FR 68904 (11/15/00)

PRM: 65 FR 68960 (11/15/00)

State Submission: 12/27/99

State Final: 10 C.S.R. 10-6 (7/30/00)

APDB File: MO-174

Description: This revision amends, corrects errors and clarifies regulatory text to conform to current Federal requirements.

[illegible]

CFR: 40 C.F.R. 52.1320(c)

FRM: 65 FR 8060 (2/17/00)

PRM: 61 FR 10968 (3/18/96) and 62 FR 35756 (7/2/97)

State Submission: 11/12/99

State Final: 10 C.S.R. 10-5 (12/30/96)

APDB File: MO-76

Description: This revision specifies restrictions for municipal solid waste landfills in the St Louis ozone nonattainment area that have accepted waste any time since November 8, 1987, or have additional capacity available for future waste deposition.

[illegible]

CFR: 40 C.F.R. 62.6357

FRM: 63 FR 20320 (4/24/98)

PRM: 63 FR 20360 (4/24/98)

State Submission: 1/26/98

State Proposal: 21 MR 1515 (6/17/96)

State Final: 10 C.S.R. 11 (6/30/97)

APDB File: MO-123

Description:	This rule requires municipal solid waste landfills to monitor their NMOC emissions.
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[illegible]

Difference Between the State and EPA-Approved Regulation

None.

